

**REMARKS**

Claims 1-8, 10-17 and 21-32 are pending. In the Office Action mailed December 18, 2006, the Examiner withdrew numerous objections and rejections to the pending claims with the exception of the alleged objections and rejections described below. In addition, although the Examiner did not expressly state that Claim 1 was included in item 7, page 3, Office Action Mailed December 18, 2006, Applicants believe that the Examiner implicitly removed the rejection of Claim 1, under 35 U.S.C. §102(b) as being anticipated by Siminszky et al., (U.S. Patent No. 6121512, issued on Sept. 19, 2000). Please advise the Applicant's if this rejection of Claim 1 was not withdrawn.

The Applicants further point out that previously Claims 1, 15, 21, and 25-31 were rejected under 35 U.S.C. §112, first paragraph, however in the present Office Action Claims 1-8, 11-17, and 21-32 are now rejected for lack of written description. Additionally, previously amended claims 16 and 17 are now rejected with Claims 1-8, 10-15, 21-32 under 35 U.S.C. §112, first paragraph for lack of enablement. Each remaining objection and rejection is addressed below.

**I. Specification: Redaction of Embedded Hyperlinks**

The Examiner objects to embedded hyperlinks, particularly on pages 43 in line 1 paragraph [0156], 46 in line 19 paragraph [0169], page 48 in line 7 paragraph [0174], page 98 in lines 11 and 30 paragraphs [0326] [0328], page 99 in lines 20 and 25-27 paragraphs [0330] [0331], page 102 line 25 paragraph [0339], and page 104 in line 12 paragraph [0342]. (Office Action mailed December 18, 2006, page 4). The Applicants now amend the Specification using the suggested replacement of "www." with "on the world wide web at" to remove all embedded hyperlinks.

**II. Title**

The Examiner continues to object to the amended Title as "not being descriptive of the elected invention." (Office Action mailed December 18, 2006, page 4). The following title is suggested by the Applicants: "Novel Carotenoid  $\epsilon$ - and  $\beta$ -Hydroxylases for use in engineering carotenoid metabolism in plants."

### **III. Written Description Rejections**

Claims 1-8, 11-17, and 21-32 are rejected under 35 U.S.C. §112, first paragraph, as allegedly failing to comply with the written description requirement. (Office Action mailed December 18, 2006, pages 5-6). The Applicants note that the Examiner makes a statement agreeing with the Applicant's argument that the amino acid sequence of SEQ ID NO:04 (and SEQ ID NO:05 which encodes SEQ ID NO:4) is structural information plainly understood by a person of ordinary skill in the art." and "this is why claim 10 is sufficiently described." The Applicant's respectfully submit that Examiner's stated "sufficient description for claim 10" (Office Action mailed December 18, 2006, page 5, paragraph 2) also applies to the remaining claims.

Furthermore, the Examiner states that polypeptides with as little as 80% identity to SEQ ID NO:04 are not taught in the prior art." The Applicants respectfully disagree. Although the Applicant's believe that the following information is not necessary under Falkner v. Inglis, 448 F.3d 1357; 79 U.S.P.Q.2D (BNA) 1001 (Fed. Cir. 2006), the Applicant's point out that they did provide amino acid sequence comparisons between LUT1 and numerous plant sequences in Figures 9 and 10 (*see*, Application as published) demonstrating 80% sequence similarity to SEQ ID NO:04. Moreover, although the Applicant's believe this is not necessary, the Applicant's also provided actual amino acid sequence information for these sequence comparisons in Figure 23, SEQ ID NOs:18-21, (*see*, sequence information in Application as published). The Examiner alleged a lack of comparative sequence information as support for the rejection, however, the specification contains such information as just described.

Thus the written description requirements have been met. Accordingly, the Applicants respectfully request these rejections be withdrawn for Claims 1-8, 11-17, and 21-32.

### **IV. Enablement Rejections**

Claims 1-8, 10-15, 21-32, and previously amended claims 16 and 17 are rejected under 35 U.S.C. §112, first paragraph, as allegedly failing to comply with the enablement requirement. (Office Action mailed December 18, 2006, pages 6-9). In particular, the Examiner states, " . . . that between 1993/1998 and the time of filing (2004), there was

no leap forward in methods of expressing LUT1 in yeast or methods of expressing membrane proteins in prokaryotes taught in the art. The instant specification has not taught any specific strategies to overcome the difficulties of attempting to express a membrane protein in a prokaryote.” The Applicants respectfully disagree. In particular, the invention as claimed is enabled, for example, by describing a prokaryotic vector (pMLBART vector (Gleave, Plant Mol. Biol. 20, 1203-1207 (1992), see paragraph [0327] of the published application) and a yeast expression vector comprising a LUT1 cDNA, see, Figure 12 of the published application. Further, the invention as claimed is also enabled by including a reference that describes the successful expression of a plant carotenoid biosynthetic transmembrane protein in prokaryotes. Specifically, “In still other embodiments of the present invention, the host cell can be a prokaryotic cell (e.g., a bacterial cell). . . . Specific examples of host cells include, but are not limited to, *Escherichia coli*, . . . *Saccharomyces cerevisiae*, *Schizosaccharomyces pombe*, . . . Examples of host cells for carotenoid production are described in U.S. Pat. No. 5,744,341 to Cunningham, et al. (Jul. 4, 1995), herein described by reference.” (See, Application as published, paragraph [0250]). In particular, U.S. Pat. No. 5,744,341 demonstrates expression of a plant transmembrane protein that produces a product in *E. coli* cells. (See, Col 9, lines 1-29). Accordingly, the Applicants respectfully request these rejections be withdrawn.

Again, as held by the Federal Circuit in Falkner v. Inglis, “Since the law is applied to each invention in view of the state of relevant knowledge, its application will vary with differences in the state of knowledge in the field and differences in the predictability of the science.” Falkner v. Inglis, 448 F.3d at 1367-68. The Examiner has provided no evidence that the current invention is unpredictable as of the filing date of the invention. Instead, the Examiner has relied on outdated papers published in 1993 and 1998.

Finally, the Examiner admits a carotenoid biosynthesis function by stating “This data [provided in the instant invention] demonstrates that LUT1 [SEQ ID NO:05] is involved in the carotenoid biosynthetic pathway and that it is required to make zeinoxanthin.” (Office Action mailed December 18, 2006, page 8, paragraph 2, emphasis added). This statement acknowledges the Applicant’s showing that expression of SEQ

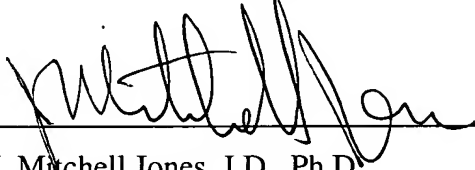
ID NO:05 in a plant produced a specific phenotype that was detected using assay for zeinoxanthin, specifically revealing one or two yellow bands of zeinoxanthin. (*See*, Application as published, paragraph [0325]). Thus SEQ ID NO:05 is acknowledged by the Examiner as being capable of producing a desired carotenoid biosynthesis function in a plant.

Accordingly, the Applicants respectfully request these rejections for Claims 1-8, 10-15, 21-32, and previously amended claims 16 and 17 be withdrawn.

### **CONCLUSION**

The Applicant believes the arguments set forth above traverse the Examiner's objections and rejections and therefore request these alleged grounds for objection and rejection be withdrawn. Should the Examiner believe a telephone interview would aid in the prosecution of this application, the Applicant encourages the Examiner to call the undersigned collect.

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